



# **International Society of Biomechanics Newsletter**

**AUTUMN ISSUE 1988 N° 32**

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# Editorial

## ANNOUNCEMENT: XIIIrd CONGRESS OF ISB VENUE

At a recent meeting of the ISB Executive Council it was decided that the hosting of the XIIIrd Congress would be awarded to the Biomechanics group at the University of Western Australia, in Perth, Australia. The organisation of this Congress will be coordinated by Graeme Wood, and the intended date is December 9-13, 1991.

The University of Western Australia is located in Nedlands, Western Australia, on the banks of the Swan River just 5 kilometers from downtown Perth. The University is Australia's 4th largest university and provides educational and research facilities to over 10,000 students in ten Faculties, namely Medicine, Dentistry, Science, Engineering, Education, Law, Economics and Commerce, Agriculture, Architecture and the Arts. The department of Human Movement Studies is the 12th largest on campus and offers courses in Biomechanics, Exercise Physiology, Motor Learning and Control, Adaptive P.E. and Sports Psychology leading to BSc/MSc, BPE/Dip Ed, BEd/MEd and PhD degrees. The department's Graduate programme is the largest of its kind in Australia and attracts students from both the Eastern States and overseas.

It was proposed that the XIIIrd Congress be held during the second week of December, in order to take advantage of the early Summer conditions and student vacation period. Details of Perth's average climate at this time are:

Temperature: 16.2 C minimum  
27.4 C maximum

Humidity: 51% 9.00 a.m.  
44% 3.00 p.m.

Rainfall: 14 mm on 4 days only.

Several Colleges and Halls of Residence are located on the immediate perimeter of the campus and will provide low-cost bed-and-breakfast style accommodation.

Western Australia is serviced by two National airlines which provide a daily service from the Eastern States (Sydney, Melbourne and Adelaide). Qantas, British Airlines, Air New Zealand, Singapore Airlines, Malasian Airlines, Cathay Pacific, Garuda, and JAL all have direct flights into Perth's International Airport, which, together with United and Continental who fly into Sydney provides links with all major International terminals around the world.

Temporary visitors, not intending to stay in Australia for more than 6 months need only have a 'Visitors' visa, which can be obtained from any overseas Australian Embassy or Consulate.

A 'First Announcement' brochure will be prepared later this year for distribution with XIInd Congress materials, and a video extolling the virtues of Perth and the University of Western Australia will be prepared for showing at UCLA.

The organisers of the proposed Congress can be contacted in the following ways:

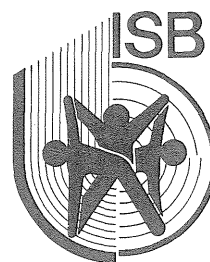
Airmail: Department of Human Movement Studies,  
The University of Western Australia, Nedlands WA  
6009, AUSTRALIA.

Electronic Mail: PSI%29382100020::G\_\_WOOD

Telex: AA92992

Telegrams: Uniwest Perth

Fax: 61-9-389-1053



The University of Queensland, Australia is seeking applicants for its 1990 postdoctoral research fellowships. Application may be made to study in any department within the University but applicants are particularly sought by the Department of Human Movement Studies for candidates with interests in motor learning and control and/or biomechanics. Any successful applicant in these areas would be expected to work with the incumbent staff Dr Bruce Abernethy in motor learning and control and Dr Robert Neal in biomechanics in collaborative research projects and grants seeking. Applicants must not have held a doctoral degree for more than five years as at 30 June and carry a salary of \$24,846-\$28,340 (Australian) plus economy air fares to and from Brisbane. Prospective applicants should write in the first place to

Dr. Ian Jobling,

Head, Department of Human Movement  
Studies

University of Queensland  
ST LUCIA, 4067, Australia

Phone: (07) 3773958; Fax (07) 3715896.

Applications close 27 February 1989.

**Send us a touristical postcard with your fax and/or electric mail number for systematic publication in the newsletter.**

# Calendar of world wide scientific events

## Oct. 16-19, 1988

Hilton Head, South Carolina, Occupational Low Back Pain. For pre-registration & information: Maureen E. Hanagan, Director Continuing Medical Education, 233 Rowell building, University of Vermont, Burlington, VT 05405 (802) 656-2292

## Oct. 17-18-19, 1988

Paris, 4th Congress-World Conference Structural Analysis Systems FEMCADO. Patronage: French Minister of Research and Education. Organisation: Institute for Industrial Technology Transfer.

## Oct. 18-19, 1988

"Biomat 88". Hybrid artificial organs. Concepts and development. University Hospital of Bordeaux II - France (c/o Mrs. Rouais, Biomat 88 - INSERM U 306 - Université de Bordeaux II, 146, rue Léo-Saignat, 33076 Bordeaux Cedex Phone 56 93 12 72. Telex 550 491 F.

## Oct. 24-28, 1988

Var Gard (Stockholm), Advanced International Course: Applied Work Physiology (Secretariat: National Institute of Occupational Health - S.S. Bonnevier - IU - NIVA - S 17184 Solna - Sweden).

## Nov. 14-17, 1988

Basel, Switzerland, Biostereometrics '88, The Fifth International Meeting, Congress Center F. Hoffmann-LaRoche & Co., AG.

## Nov. 14-18, 1988

Moscow, 2nd Workshop on Criteria for the evaluation of effects of whole body vibration on man. (Secretariat: Institute of Industrial Hygiene and Occupational Diseases of the USSR, Academy of Medical Sciences, Prospect Budennogo 31, Moscow 105275, USSR).

## Nov. 15-16, 1988

Papendal, The Netherlands, Sport for All; Sports Injuries and their Prevention, National Institute for Sports Health Care (NISGZ), National Sports Centre Papendal, The Netherlands, P.O. Box 90, 6860 Oosterbeek, The Netherlands.

## Jan. 5-7, 1989

Convention announcement and call for papers. The Annual Meeting of the National Association for Physical Education in Higher Education will be held in San Antonio, Texas. Theme: What should professionals in physical education know? What should professionals in physical education do?

## April, 26-30, 1989

Vienna, Austria, Advances in Ergometry, 6th International Seminar on Ergometry, ICSSPE, International Council of Sport Science and Physical Education, Working Group on Ergometry, Scientific Secretariat: Doz. Dr. Norbert Bachl, Institut für Sportwissenschaften der Universität Wien Abteilung Sportphysiologie (Institute of Sport Sciences, Department Sport Physiology), Auf der Schmelz 6, A-1150 Wien/Vienna, Austria.

## April 27-29, 1989

Leuven, Belgium, "XIVth Meeting of the European group of Pediatric Work Physiology" (c/o Prof. Dr. G. Beunen, K.U.L., I.L.O., Tervuurse Vest 101, 3030 Heverlee, Belgium) Tel.: 016/22.23.10.

## May 14-19, 1989

Papendal, The Netherlands, "IXth Congress for Sports Information", Theme: "Effective Sports Information for the Nineties" (c/o: Rob Timmer, Secr. Gen. of IASI, Laan van Meerdervoort 1a, 2517 AA The Hague, The Netherlands) Tel.: (070)632963. Telex: 34379 nsfsp.

## June 21-24, 1989

Berlin (West), FRG, "7th Intern. Symposium Adapted Physical Activity - an interdisciplinary approach" (c/o 7th ISAPA BERLIN '89, Secretary, Institut für Sportwissenschaft, Freie Universität Berlin, Rheinbabenallee 14, D-1000 Berlin 33) Tel.: (030)824.37.31.

## June 26-30, 1989

Los Angeles, "XII Congress of Biomechanics" (c/o XII Intern. Congress of Biomechanics, UCLA Deptm. of Kinesiology, 2854 Slichter Hall, Los Angeles, CA 90024-1568, USA. Tel.: (213)825-3910 of 825-5376.

## June 29-July 3, 1989

Maccabiah-Wingate, International congress on sport sciences & coaching. International Congress Secretariat: Wingate Institute for Physical Education & Sport, Wingate Post 42902, Israel.

## July 14, 1989

Helsinki, 31th International Congress of Physiological Sciences. (Secretariat: Pr. O. Hanninen - Travel Experts Ltd - P.O. Box 722 - SF - 00101 Helsinki - Finland)

## July 16-19, 1989

Paris, Symposium 'Head Movement Control'. (Secretariat: A. Berthoz - CNRS - Laboratoire de Physiologie Neurosensorielle - 15 rue de l'Ecole de Médecine - 75270 Paris)

## July 18-21, 1989

Birmingham, United Kingdom, 'International Sports Science Conference'. Theme 'Science in the service of sport' (c/o The Sports Council, 16 Upper Woburn Place, London WC1H 0QP). Tel.: 01-3881277, Fax: 01-3835740, Telex: 27830 SPORTC G.

Send us a touristical postcard with your fax and/or electric mail number for systematic publication in the newsletter.

**July 23-27, 1989**

Denpasar, Indonesia, 'IX IAPESGW World Congress'. Theme: 'Better Family Life Through Physical Education and Sport' (c/o XI IAPESGW Congress, Gedung Koni, Jalan Gelora Pintu Satu, Jakarta 10270, Indonesia). Tel. (65021) 587492 - 5481890, Telex: 45214 koni ia.

**Aug. 07-12, 1989**

Singapore, '7th World Congress on Sport Psychology'. Theme: 'Sport Psychology and Human Performance' (c/o Dr. C. K. Giam, Singapore Sports Council, National Stadium, Kallang 1439, Singapore). Tel: (65) 3457111, Telex: rs 35467 natstad.

**Aug. 28-Sep. 01**

Turku, Finland, '2nd Paavo Nurmi Congress and Advanced European Course on Sports Medicine'. (c/o Dr. Martti Kvist, M.D., Sports Medical Research Unit, Kiinamyllynk. 10, SF-20520 Turku, Finland). Tel.: 358-21-513355.

**Aug. 29-Sep. 01, 1989**

Saarbrücken, FRG, International Symposium on 'Research in Motor Learning and Movement Behavior' (c/o Prof. Dr. Reinhard Daus, Sportwissenschaftliches Institut der Universität des Saarlandes, Im Stadtwald, 6600 Saarbrücken, FRG). Tel.: (0681)3024170.

**Sep. 05-08, 1989**

Barcelona, Spain, 'XVI Congreso Grupo Latino y Mediterraneo de Medicina del Deporte' (c/o CEARE, Residencia Blume, Av. Paisos Catalans, 12, 08950 Esplugues de Llobregat, Barcelona, Espana). Tel.: 254 07 78.

**Sep. 11-15, 1989**

At the London Hospital, London, England. VIIIth World fina Medical Congress on Aquatic Sports. Further Information: Conference Service Limited, Aldine House, 9-15 Aldine Street, London W12 8 AW. Tel.: 01-740 8121 (International 2 44-1-740 8121) Telex: 916024 Confer G.

**Oct. 29-Nov. 3, 1989**

Colorado Springs, Colorado, U.S.A., World Congress on Sport Sciences. Promoted by the International Olympic Committee, Medical Commission. Organized by the United States Olympic Committee, c/o M.M. Newsom, U.S. Olympic Committee, 1750 East Boulder Street, Colorado Springs, CO 80909 U.S.A.

**Jan. 28-Feb. 02, 1990**

Auckland, New Zealand, IXth Commonwealth and International Conference (c/o Conference Convenor 1990, Ms. Rosalie King, Auckland College of Education, Private Bage, Symonds St., Auckland, New Zealand).

**May 21-25, 1990**

Brussels, Belgium, International Congress on 'Youth, Leisure and Physical Activity'. Vrije Universiteit Brussel, HILOK, P. De Knop, secretary general, Pleinlaan 2, B-1050 Brussels, Belgium.

**May 21-25, 1990**

Brussels, Belgium, International ISAK-congress 'Kinanthropometry IV' incorporated in the international congress on 'Youth, Leisure and Physical Activity' (c/o Dr. P. De

Knop, Vrije Universiteit Brussel, HILOK, VTBP, Pleinlaan 2, 1050 Brussel, Belgium). Tel.: (02)641 27 44, Telex: 61.051 VUBCO-B, Fax: (02)641.22.82.

**May 27-June 01, 1990**

Amsterdam, The Netherlands, XXIV FIMS World Congress of Sports Medicine (c/o Organisatie Bureau Amsterdam b.v., Europaplein 12, 1078 GZ Amsterdam, The Netherlands. Tel.: 31/2044087. Telex: 13499 raico nl.).

**April 8-13, 1991**

Maastricht, The Netherlands, 'Second World Congress of Science and Football' (c/o Prof. J.M. Greep, Dept. of Surgery, Academic Hospital St. Annadel, Maastricht, The Netherlands).

**Sep. 10-15, 1991**

Cologne, FRG, '8th European Congress of Sport Psychology'. Theme: 'Movement and Sport: Psychological Fundamentals and Effects' (c/o Erwin Hahn, Bundesinstitut für Sportwissenschaft, Carl-Diem-Weg, 5000 Köln, 41, FRG). Tel.: (0221)4979-161, Telex: 8881178 bisp d.

**(date and place to be fixed)**

"6th Symposium on Biomechanics and Medicine of Swimming"

**RECTIFICATION**

In the 'special article' on software development by H.J. Woltring (ISB-Newsletter 31, Summer 1988), reference was made to the 'gev sublibrary' of Netlib. This should be 'gcv sublibrary', which contains a number of software procedures for one- and multidimensional smoothing of noisy data based on the *Generalized Cross Validation* criterion described by, e.g., Woltring in his quoted paper, and by C.R. Dohrmann, H.R. Busby, & D.M. Trujillo, Smoothing Noisy Data Using Dynamic Programming and Generalized Cross-Validation, *Journal of Biomechanical Engineering* 110 (1988), 69-73.





# Thesis abstract corner

## IMPULSE CHARACTERISTICS AND UPPER LIMB LOADINGS OF AIDED GAIT

K.A. Opila

PhD Thesis

University of Strathclyde, 1985

Supervisor: A.C. NICOL

### ABSTRACT

This study was undertaken to quantitatively evaluate how walking aids assist in the locomotion of persons with musculoskeletal or neural deficiencies. The ability to perform aided gait and protect deformities and other unaffected joints depends on physiological, metabolic, biomechanical and psychological factors. Clinically, walking aids and gait patterns are prescribed by optimising the requirement of the patient and the functioning of the aid in terms of restraint/propulsion, stability and support.

Three types of disabilities were analysed — paraplegia, post-operative hip arthroplasties and complex tibial fractures — whose primary needs for walking aids correspond to the three functions respectively. The paraplegic and fracture subjects were aided with elbow crutches and the hip replacement subjects used sticks which had been strain-gauged to measure forces in three dimensions. The reaction forces on the limbs were also monitored by a Kistler forceplatform. Synchronous data of upper limb joint centre positions were acquired at 50 Hz using the Strathclyde television system to determine elbow and shoulder joint moment loadings and to evaluate the amount of elbow flexion during aid usage.

The parameter of impulse (area under the force-time curve) was selected to quantify the contribution of the aids and limbs to locomotion and was shown to readily differentiate between the three functions of walking aids. The aid loadings transmitted to the upper limbs consistently caused the glenohumeral joint to extend and abduct with the elbow joint either flexing or extending. Glenohumeral joint extension moments of paraplegic subjects were as much as 0.10 Nm/BW equivalent to moments developed at the hip joint during gait. The muscular effort required, both to balance the upper limb joint moments and to cause velocity fluctuations which ranged from 28% to 176% of average velocity values during the gait cycle, contributes to the high metabolic costs associated with aided gait. From the biomechanical results, the effects of modifications on the standard elbow crutch to improve function relative to the ability of the upper limb to transmit the loadings were examined hypothetically and practically.

## THE MECHANICAL TESTING OF MORSE TAPERS

by

Paul Reeves

A Thesis submitted for the degree of Master of Science (Bioengineering) of The University of Strathclyde.

Supervisor: R. WILKINSON

### ABSTRACT

Large size femoral implants have been in use for the last forty years. Originally the prostheses were custom made for each patient, at first primarily from plastics but soon metallic implants rapidly became the standard. Due to the cost and time involved in manufacturing the custom made implants it was realized that a cheaper and more flexible system was required. One approach to the problem is to use a modular system whereby the patient is measured and fitted with an implant in a single operation, without being constrained by manufacturing times or delays.

This thesis attempts to test a mechanical coupling method based on a standard industrial system, the self-locking taper. The particular emphasis is to establish the minimum length of taper required for reliable locking. Taper length controls the step size of an individual component.

Bend tests were performed as this mode was thought to be the critical case for the unlocking of the coupling system. Tests were also carried out to establish the uniaxial load performance of the joint as well as whether industrial manufacturing standards will produce a reliable joint between previously unconnected components.

The tests established that an implant could be produced with a stepwise increase in length between sizes of around 20 to 25 mm. It was also found that the length of the coupling systems is much more significant when resisting bending loads than uniaxial tension.

The tests on the coupling system require further work to establish confidently whether self-locking tapers produced to industrial standards are reliable enough to act as the coupling system for a modular implant system.

## THE EFFECT OF AUDIO FEEDBACK ON THE DENERVATED KEY-GRIP

Master of Science, (Bioengineering),  
of the University of Strathclyde

Robert Farley  
September 1985  
Glasgow

### ABSTRACT

An audio-feedback system, based upon a conductive foam, was built in order to replace the absent sensory facility in the denervated hand.

A tracking test system was designed and built, comprising a microcomputer and pinch-force transducer. This was used to assess the performance of the hand when in the key-grip mode.

Eight normal volunteers and two patients tracked constant force and sinusoidally varying force targets. Patients repeated the exercise using audio-feedback.

Comparison of patient performance with that of the normal enabled a qualitative assessment to be made of the effect of audio-feedback.

It was found that the tracking response of patients tended to that expected from the normal when using feedback.

# BIOMECHANICAL MODEL OF THE HUMAN BODY FOR THE ANALYSIS AND ASSESSMENT OF SPINAL STRESS DURING LOAD MANIPULATION

by

Matthias Jäger

Thesis: Biomechanisches Modell des Menschen zur Analyse und Beurteilung der Belastung der Wirbelsäule bei der Handhabung von Lasten. VDI-Verlag, Düsseldorf, 1987.

Supervisor: Prof. Dr. W. Laurig

Institute of Occupational Health  
at the University of Dortmund

Department of Work Physiology III (Ergonomics)

## ABSTRACT

Epidemiological studies have shown that, within the skeletal and locomotor systems, the spine is particularly frequently affected by complaints and damage. Persons who manipulate loads occupationally often complain about low-back pain and irreversible damage in the lumbar-spine region. The measurement of characteristic mechanical values for strain (e.g., torque, force, pressure) has hitherto only been carried out in the medico-clinical field (e.g., Nachemson 1959, Andersson et al. 1977). Biomechanical simulation calculations are, however, suitable for the routine analysis of load manipulation. Earlier biomechanical human models are two-dimensional in the sagittal plane (e.g. Morris et al. 1961, Chaffin 1969), since the analyses were predominantly concerned with heavy-load lifting, commonly a bi-manual operation.

The three-dimensional human model presented in this paper additionally permits the calculation of the mechanical load on the lumbar spine during non-symmetrical load manipulation. The model comprises 19 body segments which can be moved at a total of 18 joints. The following elements are considered in the model: the foot, shank, thigh, hand, forearm and upper arm were included for the left and right body halves respectively. The trunk, to which a head-neck segment is connected, is subdivided into a thoracic, lumbar, and a pelvic section. The provision of 5 joints at the level of the intervertebral discs in the lumbar spine permits consideration of various trunk flexions.

The influence of the inertia occurring during the movements must be considered in addition to the weight forces and their torques. This requires knowledge about mass distributions within the segments and the load. In this paper, the body segments are assumed to be cylindrical or conical in shape. Almost all of the data relating to anthropometry and weight distribution could be taken from the literature.

The spinal torques caused by the body and load masses are compensated for by the back and abdominal muscles, as well as by the supportive effect of the intra-abdominal pressure. An approximation of the trunk system at the level of the lumbar spine is achieved using a total of 8 muscles. The determination of the pressure within the abdominal cavity is based on the measured data provided by Morris et al. 1961 and on the model which Chaffin (1969) derived from them. They have been adapted to the more realistic conditions obtaining in the present model.

The spinal stress is determined exemplarily for two typical cases of load: load-fits in a whole body movement and one-handed load turnover in a sitting posture. The influence of the various load masses, lifting techniques, movement courses, grasp positions, as well as of simulated 'hollow-back'

and 'humpback' postures, are examined. The calculated torque and force values are compared either with strength values for the spine or with the load classification provided by Tichauer (1978) and NIOSH (1981) in order to assess load-manipulation activities and to estimate the health risk. The mechanical compressive strength of the lumbar spine is compiled by summarizing the results from about 25 series of previous measurements. The resultant mean value from a total of 283 compression tests is 5.1 kN for a standard deviation of 2.3 kN. The mechanical strength of the lumbar spine is of the same order of magnitude as the lumbar stress when loads of typical weight are manipulated (0-50 kg).

## References:

- Andersson, G.B.J.; Örtengren, R.; Nachemson, A. (1977) Intradiskal pressure, intra-abdominal pressure and myoelectric back muscle activity related to posture and loading. *Clin. Orthop.* 129, 156-164.
- Chaffin, D.B. (1969) A computerized biomechanical model-development of and use in studying gross body actions. *J. Biomechanics* 2, 429-441.
- Morris, J.M.; Lucas, D.B.; Bresler, B. (1961) Role of the trunk in stability of the spine. *J. Bone Joint Surg. (Am)* 43A, 327-351
- Nachemson, A. (1959) Measurement of intradiskal pressure. *Acta Orthop. Scand.* 28, 269-289
- NIOSH, National Institute for Occupational Safety and Health (1981) Work practices guide for manual lifting. Department of Health and Human Services, Cincinnati, Ohio. DHHS (NIOSH) publ. No. 81-122
- Tichauer, E.R. (1978) The biomechanical basis of ergonomics. Wiley, New York

## THE EFFECT OF PUSHING FREQUENCY ON THE KINEMATICS OF WHEELCHAIR SPRINTING

by

Catherine Mary Walsh

A thesis submitted to the faculty of graduate studies and research in partial fulfillment of the requirements for the degree of Master of Science

Physical education and sport studies

Edmonton, Alberta

Fall 1986

## ABSTRACT

This study examined the influence of different pushing frequencies on the time required to cover the final 40 metres of the 60-metre indoor wheelchair sprint. The study also examined the effect of different pushing frequencies on selected kinematic parameters.

Three male and three female national and international-level wheelchair sprinters participated in the study. A multiple-time-series design using two experimental groups and a cross-over of experimental treatments was used.

During the baseline period, subjects performed five repetitions of the 60-metre sprint for five consecutive days. Each subject was required to wheel in them with an auditory metronome set to his or her previously calculated, preferred pushing frequency. During the first treatment period, group 1 wheeled at a faster than baseline frequency while group 2 performed at a frequency that was slower than that of the baseline period. During the second treatment period, the treatments administered in the first treatment period were reversed.

Temporal data, which consisted of the time required to cover the final 40 metres, and every 10-metre segment within that distance, of a 60-metre sprint, showed a gradual decrease in the time required to cover each successive 10-metre segment. These results illustrated that wheelchair sprinters and stand-up sprinters demonstrated a similar pattern of peak velocity attainment. Despite the fact that the overall results of the temporal analysis suggested that frequency had no effect on the timed performances of the subjects who participated in this study, an analysis of individual performances provided support for the hypothesis that increased pushing frequency would result in increased sprinting velocities.

Cinematographical data were collected on the final day of the baseline and each of the two treatment periods using a panning technique. Each subject was filmed over a 10-metre distance in an effort to determine the effect of different pushing frequencies on the point of hand contact, the point of hand release, the magnitude of the contact arc, the pushing length and the path of the hand during the propulsion cycle. Results of the cinematographical analysis showed much variability in the manner in which the subjects responded to the different pushing frequencies. The results did however demonstrate that the treatments had an effect on both the pushing length and the path of the hand during the recovery phase of the propulsion cycle. More specifically, at the slower pushing frequency, all subjects demonstrated longer pushing lengths and hand paths that moved away from the handrim resulting in much unproductive movement. At the faster pushing frequency, shorter pushing lengths were observed. During this treatment period, the hand remained in close proximity to the handrim.

Results of this study have provided some valuable practical recommendations for coaches of wheelchair sprinters. The study has also raised a number of questions for further research.



## Book news

### A SET OF BOOKS COLLECTING THE MOST RECENT ADVANCEMENTS IN REHABILITATION TECHNOLOGY FOR THE PERSONS WITH PHYSICAL DISABILITIES IN THE EUROPEAN COMMUNITY.

The Concerted Action

#### EVALUATION OF ASSISTIVE DEVICES FOR PARALYSED PERSONS

Of the total number of handicapped persons in the European Community, those who are paralysed form a considerable percentage. The most recent advances in technology have dramatically widened the range of possibilities offered to disabled persons for improving rehabilitation, independent living, social integration, school integration and job opportunities.

The Concerted Action 'Evaluation of assistive devices for paralysed persons' was run by the Commission of the European Communities through its Directorate General XII with the aim of coordinating the ongoing research in the field, promoting exchange of experiences and knowledge among experts, evaluating either the technical characteristics of the available assistive devices or their suitability and effectiveness in meeting the actual needs of disabled persons in daily life.

About 80 research Centres, rehabilitation Centres and Industries throughout Europe are actively cooperating in the project.

Activities have concentrated on three main topics:

- Mobility aids
- Assistive devices for Walking Restoration
- Technical aids for communication, manipulation and environmental control.

The project has been led by a Project Management Group composed of the following experts

- Prof. Antonio Pedotti (Milano, Italy), project leader
- Ing. Renzo Andrich (Milano, Italy)
- Ir. Theo Bougie (Hoensbroek, The Netherlands)
- Dr. George Cochrane (Oxford, United Kingdom)
- Prof. Claude Hamonet (Paris, France)
- Ing. Hans Jochen Küppers (Heidelberg, West Germany)
- Prof. Pierre Rabishong (Montpellier, France)
- Prof. Gordon Kenneth Rose (Oswestry, United Kingdom)
- Prof. Albert Tricot (Bruxelles, Belgium)
- Dr. Michael Whittle (COMAC-BME observer)
- Dr. Roger Thull (COMAC-BME observer)
- Dr. Viviane Thévenin, Dr. Walburga Skupinsky (DGXII)
- Dr. Danielle Rimbart (HANDYNET project)
- Dr. Bernhard Weherens, Dr. Patrick Daunt, (Bureau for Action in Favour of Disabled Persons)

Further information can be obtained by the Concerted Action Secretariat:

Evaluation Project

Centro di Biomeccanica

c/a Gozzadini 7, 20148 Milano, Italy

tel. + 39-2/4043951

## **WHEELCHAIRS: RESEARCH, EVALUATION AND INFORMATION**

(eds. T. Bougie, A. Davies)  
pp. 189  
language: English  
ISBN 88-85936-00-8

Proceedings of the Topical Workshops held in Berlin, West Germany, on October 10-11, 1985 at the Technical University and the Tropical Workshop held in Hoensbroek, The Netherlands on October 8-9, 1986 at the Lucas Stichting voor Revalidatie.

The wheelchair is one of the most important and widespread technical aids for independent living. In the most recent years technological advancement brought about impressive improvements in the technical quality of wheelchairs and in their ability to meet the mobility needs of the disabled users. Frame design and materials, seating system, control apparatus, modularity, ergonomics are subject to continuous developments which involve the need of effective technical, functional and practical evaluation. This book is an important contribution towards spreading knowledge and experiences on this topic at international level, and also towards the establishment of common and shared criteria for wheelchairs evaluation.

### *Contributors:*

X. Maillard, M. Jouin, G. Boruchowitsch, P. Dolfuss (France)  
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R. Den Adel, T. Bougie, L. Van Der Voude, D. Veeger, R. Rozendal, M. Roebroek, D. Vijkman, H. Driever, L. Kusters, P. Stienen, G. Swarte (The Netherlands)  
E. Burnett, G. Bardsley (United Kingdom)  
A. Tricot, D. Henne (Belgium)  
B. Lundberg (Sweden)  
R. Andrich, C. Huriet, A. Pedotti (Italy)  
J. Kauzlarich (USA)

## **METHODOLOGY OF CONSUMER EVALUATION OF HAND PROPELLED WHEELCHAIRS**

(M. Roebroek, L. Van Der Woude, R. Rozendal)  
available in December 1988  
language: English  
ISBN 88-85936-02-4

A wheelchair functional evaluation handbook addressed at rehabilitation professionals and people concerned with research and technical development.

The results of Dutch survey of hand propelled wheelchairs carried out on a sample of 609 wheelchair users over a long time span offered the background for working out a methodology of consumer evaluation of hand propelled wheelchairs which can be useable and meaningful also in other Countries. This methodology involve telephone interviews, wheelchair diaries, failure diaries and simple instruments to be temporally installed onto the wheelchair itself. Interrelations between the various instruments are analysed with respect to the user's functional abilities, to the type of wheelchair and to the intensity of use.

## **THE ADAPTATION OF CARS FOR PARALYSED PERSONS**

(ed. H. Küppers)  
pp. 104  
language: English  
ISBN 88-85936-01-6

Proceedings of the Topical Workshop held in Heidelberg West Germany, on October 23-24, 1986 at the Stiftung Rehabilitation.

Achieving independency in driving a car is an important aspect of rehabilitation and a step towards social integration of people with disability. Access to education, vocational training, job opportunities and social relationships are some of the aspects in which the ability to drive plays a role of paramount importance. Through the contribution of experts in the field from all over Europe this book illustrates the state of the art in technology and the ongoing research activities aimed at increasing safety and reliability of driving for disabled people, especially for those with severe impairments in upper and lower limbs. Attention is also devoted to the existing national regulations and to their possible improvements.

### *Contributors:*

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## **EVALUATION OF ASSISTIVE DEVICES FOR PARALYSED PERSONS**

(eds. A. Pedotti, R. Andrich)  
pp. 206  
language: English and French, abstracts in Italian  
ISBN 88-85936-07-5

Proceedings of the European workshop held in Milano, Italy on April 27-29, 1984, at the Fondazione Pro Juventute Don Carlo Gnocchi.

The book is a unique and complete review of the state of the art and of the current trends concerning evaluation of technical aids and research into new technologies for the motor disabled, in the European Community and in the Scandinavian Countries.

### *Contributors:*

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## RESTORATION OF WALKING AILED BY FUNCTIONAL ELECTRICAL STIMULATION

(ed. J. Van Alste)  
pp. 138  
language: English  
ISBN 88-85936-03-2

Proceedings of the topical workshop held in Enschede, The Netherlands on April 8-9, 1987 at the University of Twente, Het Roessingh Rehabilitation Centre.

One of the most promising techniques for the restoration of walking in paraplegic persons is Functional Electrical Stimulation, which is rapidly progressing owing to the advancements in electrodes technology, in VLSI circuitry as well in the knowledge of motor disorders and of the strategy of muscle control. The book offers a unique and complete review in the field, very useful to researchers and clinicians concerned with rehabilitation.

### *Contributors:*

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J. Hofer (Canada)

## TECHNICAL AIDS FOR COMMUNICATION, MANIPULATION AND ENVIRONMENTAL CONTROL

(eds. G. Cochrane, C. Hamonet)  
pp. 94  
language: English  
ISBN 88-85936-04-0

Proceedings of the Topical Workshop held in Paris, France on May 8-10, 1985, at the Association des Paralyses de France.

This book is divided into three main chapters relevant to the topics of communication, assisted and robotic manipulation, environmental control. It offers a survey of the ongoing research and evaluation activities in the field at European level.

### *Contributors:*

H. Küppers, G. Vossius, G. Lormes (West Germany)  
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J. Moreau, S. Pannier, H. Kwee, P. Lacert (France)  
M. Bracale, P. Emiliani, G. Costa (Italy)

## EUROPEAN COORDINATION OF INFORMATION CONCERNING DISABLED PERSONS

(eds. A. Pedotti, R. Andrich)  
pp. 209  
language: English and French, abstracts in English, French and Italian  
ISBN 88-85936-06-7

Proceedings of the HANDYNET workshop held in Milano, Italy, on September 25-27, 1984, at the Fondazione Pro Juventute Don Carlo Gnocchi.

The HANDYNET projects is run by the Commission of the European Communities with the aim of creating a European computerised information network concerning technical and social resources for rehabilitation and integration into society. The Concerted Action has always kept close cooperation with HANDYNET. This book offers a interesting survey of the ongoing initiatives dealing with information dissemination on technologies for the disabled in the EEC and in the Scandinavian Countries.

### *Contributors:*

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J. McCann, J. Sandhu, A. Glichrist (United Kingdom)

## RESTORATION OF WALKING FOR PARALYSED PERSONS

(ed. G.K. Rose)  
pp. 90  
language: English  
ISBN 88-85936-05-9

Proceedings of the Topical Workshop held in Oswestry, United Kingdom, on March 26-27, 1985, at the ORLAU, Robert Johnes & Agnes Hunt Orthopaedic Hospital.

Restoration of walking is one of the most attractive topics of research into rehabilitation technology and recent advances in technical and medical knowledge are bringing about interesting results. Through the contribution of experts from the research and rehabilitation centres most active in this field, the book illustrates and discusses the state of the art and the results which can be achieved through three approaches: mechanical orthoses, electrical stimulation and hybrid techniques.

### *Contributors:*

G. Rose, J. Stallard, B. Andrews, H. Grenfell, J. Patrick, G. Kidd, M. McLelland, R. Edwards, M. Garret, N. Donaldson, A. Ireland, R. Luckvill, C. Dickson, P. Freeman (United Kingdom)  
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# Special article

## BIOMCH-L AN ELECTRONIC MAIL DISCUSSION FOR BIOMECHANICS

Herman J. Woltring\*  
Eindhoven, The Netherlands

An electronic mailing list had been created for members of the ISB and of related organizations (e.g. ESB, ASB, CSB) which, at least for users of EARN/BITNET/NETNORTH systems, allows free exchange of information with fellow-members on the list. In view of the overlap between Biomechanics and other fields such as Kinesiology, Bioengineering, Motor Control, and Physiology, the list is currently also open to non-members; however, this might require reconsideration in view of budgeting revision on EARN/BITNET/NETNORTH by mid-1989.

Users on EARN/BITNET/NETNORTH may subscribe to the list by electronic mail or by sending one of the following interactive commands (or the equivalent command for their system):

VAX with VMS: SEND LISTSERV HEARN SUB  
BIOMCH-L name

VM/SP: TELL LISTSERV AT HEARN SUB BIOMCH-L  
name

MVS with TSO/E: TRANSMIT HEARN. LISTSERV  
NOPROLOG

and enter SUB BIOMCH-L name PF3 on the screen

where name should be the user's full name (initials and last name).

Messages can be submitted for distribution over the list by sending the message in mail format to BIOMCH-L LEARN (but NOT to LISTSERV HEARN!). At present, the list is open for subscription and distribution without editorial interference; depending on the quality of list usage, editorial interference may remain unnecessary. Note that EARN/BITNET/NETNORTH imposes certain standards as regards non-academic use; see the relevant information which can be obtained from NETSERV HEARN or from any other NETSERV fileserver on EARN/BITNET/NETNORTH. In order to protect the subscribers' privacy, their names and electronic addresses cannot be REVIEWed (even though subscription is open to anyone); depending on subscribers' wishes, this policy might be reconsidered.

For details on the use of LISTSERV facilities, users should request general LISTSERV information by sending the request

VAX under VMS: SEND LISTSERV HEARN INFO  
keyword

or the equivalent command for other systems, where keyword can be one of the following (capitals are mandatory, lower case letter are optional):

? Short summary of all INFO files

GENintro General introduction to LISTSERV

PREsentation Summary of technical information on  
LISTSERV

REFcard Reference card with short descriptions of  
LISTSERV commands

At present, the list exists merely at the central EARN-node in The Netherlands (HEARN at the University of Nijmegen). Depending on list usage, so-called 'peer servers' may be created in other countries so as to reduce long-distance electronic mail expenses. In addition, this would allow use of the option for 'local' distribution from one server (e.g., nationwide) or for 'global' distribution from all servers simultaneously.

To some extent, non-EARN/BITNET/NETNORTH users may communicate electronic mail messages (but not interactively as in the above examples). If this fails, I shall be happy to enter their electronic addresses in the BIOMCH-L distribution list. Note that use of the facility on other networks (UUCP, ARPA/Internet, Eunet) may entail expenses which are charged to the user.

I look forward to see you in Netland!

\* EARN/BITNET/NETNORTH: wwtmhjw heitue5,  
wwtmhjw heitue51  
ARPA/Internet: na.woltring na-net.stanford.edu

## Conference news

### SYMPOSIUM

on

### BIOLOCOMOTION: A CENTURY OF RESEARCH USING MOVING PICTURES

Formia (Italy) 14-17 April 1989

organized by

Associazione Italiana di Cinematografia Scientifica

Istituto di Fisiologia Umana

Università degli Studi di Roma 'La Sapienza'

under the patronage of

International Society of Biomechanics

European Society of Biomechanics

International Scientific Film Association

We invite the students of biolocomotion to take a break from their everyday research activity, and review the work of our predecessors with the aim of acknowledging the continuity of the scientific thought, clarifying established concepts, and drawing inspiration for future work.

The Symposium will be opened by S. Cerquiglini, University of Rome 'La Sapienza'. M. Marchetti, University of Rome 'La Sapienza', a student of Borelli's work, will tell us what had been achieved in biolocomotion studies, before invention of photography. V. Tosi, A.I.C.S. member, will bring original material from the historical film archives about Marey and Muybridge. The contribution to the analysis of human walking given by C.W. Braune and O. Fisher will be discussed by P. Maquet from Bruxelles. J.P. Clarys, Vrije Universiteit Brussel, will deal with the origin of electromyographic investigations. The scientific impact of Marey's work will be reviewed by S. Bouisset, University Paris Sud. H. Jansons, from Riga, U.S.S.R., will present the most interesting material belonging to the Russian scientist Bernstein. Everybody is aware of the gigantic work done by the California team at Berkeley. This will be illustrated by J.P.

Paul, University of Strathclyde. The development of optoelectronics, its present and future use in biolocomotion will be presented by A. Cappozzo, University of Rome 'La Sapienza', and N. Berme, The Ohio State University. The contribution given by moving picture techniques to orthopedics will be discussed by R. Brand, The University of Iowa. R. McN. Alexander, University of Leeds, will address the state of the art knowledge in animal locomotion. D. Carpitella, University of Rome 'La Sapienza', will talk about the cultural kinesic aspects of biolocomotion.

Contributed papers are solicited in all fields relevant to the use of moving pictures in the study of biolocomotion. Both oral and poster presentations are planned.

The deadline for the receipt of the abstracts is January 31, 1989.

Ten guest studentships are available for selected participants, aged under 30. Send application, accompanied with professional resumé and list of publications to the Symposium secretariat before January 31, 1989.

#### INQUIRES

Secretariat: Lia Galliano, AICS - Via A. Borelli 50, 00161 Roma, phone: INT - 6 - 490820

Aurelio Cappozzo, Istituto di Fisiologia Umana, Università degli Studi 'La Sapienza' - 00185 Roma, phone: INT - 6 - 490673

Necip Berme, Department of Mechanical Engineering, The Ohio State University, 206 West 18th Avenue, Columbus, Ohio 43210, USA, phone: INT - 614 - 4220859



#### IMPORTANT NOTICE CALL FOR NOMINEES

Under the election procedures adopted in 1981, elections of Executive Council members and President Elect take place every two years and are coordinated by the Past President of the International Society of Biomechanics. All active members are encouraged to submit names of possible nominees for the Executive Council and for President Elect to the Past President prior to February 1, 1989.

The general guidelines for such nominations should be:

- (1) International (It would be wise to have a Council that represents many different countries and does not have too many members from the same country).
- (2) Fields of Interest (It would be wise to have a Council that is representative of the diverse fields of interest of the Society. Such fields include, in alphabetical order, Locomotion, Motor Control, Occupational, Orthopaedic, Sport and Tissue Biomechanics).
- (3) Scientific Quality (It would be wise to have a Council made up of members who are recognized for the quality of their scientific work).
- (4) Organizing Ability (Because most of the work of the Council is organizational in nature, organizing ability is of great importance).

Potential nominees should be contacted prior to submission of the name to ensure that the member being nominated is willing to serve if elected.

A slate of official nominees will be developed from the list of names submitted, including those individuals who are currently members of the Executive Council and are eligible for re-election. (Each Council member's term is for two years with the possibility of being re-elected twice.) The official mail ballot will be sent to all active members during the Spring of 1989.

Voting will be conducted to select a President Elect and ten members of the Executive Council.

Please send names of potential nominees to:  
James G. Hay, Ph. D., Past President ISB, Department of Exercise Science, The University of Iowa, Iowa City, IA 52242, U.S.A.

## Book review

### SCIENCE AND FOOTBALL

Thomas Reilly, Adrian Lees, K. Davids and W. Murphy are all in the Department of Sports and Recreation studies at Liverpool Polytechnic where Dr Reilly is Reader in Sports Science.

This contains, edited and revised, all the papers presented at the first World Congress of Science and Football.

Held under the auspices of the International Council of Sports Science and Physical Education, the Congress was a unique gathering of international scientists researching into football and practitioners professionally involved in the many football codes. American football, soccer, rugby league, rugby union, Australian rules, Gaelic football and national variations of these games are all covered in depth, in both amateur and professional systems.

Nutrition, biomechanics, sociology, coaching, equipment, training, tactics & strategy are among the main subject areas the contributors cover. With over 40 countries represented and with players, managers and coaches involved as well as academics the book represents a truly international, comprehensive and practical picture of football today.

April 1988, hardback, 240 x 159, 672 pages, 0 419 14360 2, £ 26.50.

# ISB membership news

## ISB MEMBERS WITH UNKNOWN ADDRESSES

Any ISB member who knows the current address of any of these members should forward that address to the ISB Treasurer.

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## DECEASED

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